ROC920000302US1 Express Mail No. EL684621158US

WHAT IS CLAIMED IS:

1. A method for performing alias refinement, the method comprising:

determining whether a load of an address exists for a variable in an intermediate representation of a source code;

determining, if the load of the address exists for the variable, whether each use of the address is for an indirect reference to the variable;

replacing, if a particular use of the address is for an indirect reference to the variable, the indirect reference in the intermediate representation with a direct reference to the variable; and

removing, if all uses of the address are for an indirect reference to the variable, the variable from an address taken alias set used with the intermediate representation.

- 2. The method of claim 1 wherein the address load determining, the use determining and replacing is repeated for each instruction in the intermediate representation.
- 3. The method of claim 1 further comprising:

creating a candidate list for the intermediate representation, where the candidate list contains the variable that requires the load of the address for the variable in the intermediate representation; and

removing, if one use of the address involves no indirect reference, the variable from the candidate list.

- 4. The method of claim 3 wherein the variable remaining on the candidate list is removed from the address taken alias set.
- 5. The method of claim 1 wherein the use of the address is represented with a pointer variable.
- 6. The method of claim 1 wherein the use of the address is represented in the intermediate representation with a load address command and a load of a value pointed by a pointer variable.

- 7. The method of claim 1 wherein the indirect reference in the intermediate representation comprises one of an indirect store of the variable to a memory and an indirect load of the variable from the memory.
- 8. The method of claim 1 wherein the indirect reference is a parameter in an inline procedure call.
- 9. The method of claim 1 wherein the use determining comprises: propagating the uses of the address in the intermediate representation.
- 10. The method of claim 1 further comprising:
 generating, after the replacing and the removing, the object code from the intermediate representation using the alias set; and executing the object code.
- 11. A method for performing alias refinement, the method comprising:

 determining whether a load of an address exists for a variable in an intermediate representation of a source code;

determining, if the load of the address exists for the variable, whether each use of the address is for an indirect reference to the variable;

replacing, if a particular use of the address is a parameter in a procedure call, the parameter with a direct reference to the variable; and

removing, if all uses of the address are for a parameter in a procedure call, the variable from an address taken alias set used with the intermediate representation.

12. An apparatus for performing alias refinement, the apparatus comprising:

a memory for storing a compiler program; and
a processor comprising a plurality of registers, where upon executing the compiler program, the processor is configured to:

determine whether a load of an address exists for a variable in an intermediate representation of a source code;

determine, if the load of the address exists for the variable, whether each use of the address is for an indirect reference to the variable;

replace, if a particular use of the address is for an indirect reference to the variable, the indirect reference in the intermediate representation with a direct reference to the variable; and

remove, if all uses of the address are for an indirect reference to the variable, the variable from an alias set used with the intermediate representation.

- 13. The apparatus of claim 12 wherein the processor determines the address load, determines the use, and replaces the indirect reference for each instruction in the intermediate representation.
- 14. The apparatus of claim 12 wherein the processor is further configured to:
 create a candidate list for the intermediate representation, where the candidate list
 contains the variable that requires the load of the address for the variable in the
 intermediate representation; and

remove, if one use of the address involves no indirect reference, the variable from the candidate list.

- 15. The apparatus of claim 14 wherein the variable remaining on the candidate list is removed from the address taken alias set.
- 16. The apparatus of claim 12 wherein the processor is further configured to: generate, after the replacing and the removing, the object code from the intermediate representation using the alias set; and execute the object code.
- 17. A computer readable medium storing a software program that, when executed by a computer, causes the computer to perform a method comprising.

determining whether a load of an address exists for a variable in an intermediate representation of a source code;

determining, if the load of the address exists for the variable, whether each use of

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the address is for an indirect reference to the variable;

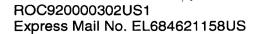
replacing, if a particular use of the address is for an indirect reference to the variable, the indirect reference in the intermediate representation with a direct reference to the variable; and

removing, if all uses of the address are for an indirect reference to the variable, the variable from an alias set used with the intermediate representation.

- 18. The computer readable medium of claim 17 wherein the address load determining, the use determining and replacing is repeated for each instruction in the intermediate representation.
- 19. The computer readable medium of claim 17 wherein the method further comprises: creating a candidate list for the intermediate representation, where the candidate list contains the variable that requires the load of the address for the variable in the intermediate representation; and

removing, if one use of the address involves no indirect reference, the variable from the candidate list.

- 20. The computer readable medium of claim 19 wherein the variable remaining on the candidate list is removed from the address taken alias set.
- 21. The computer readable medium of claim 17 wherein the use of the address is represented with a pointer variable.
- 22. The computer readable medium of claim 17 wherein the use of the address is represented in the intermediate representation with a load address command and a load of a value pointed by a pointer variable.
- 23. The computer readable medium of claim 17 wherein the indirect reference in the intermediate representation comprises one of an indirect store of the variable to a memory and an indirect load of the variable from the memory.



- The computer readable medium of claim 17 wherein the indirect reference is a parameter in a procedure call.
- The computer readable medium of claim 17 wherein the use determining comprises:

propagating the uses of the address in the intermediate representation.

26. The computer readable medium of claim 17 wherein the method further comprises: generating, after the replacing and the removing, the object code from the intermediate representation using the alias set; and executing the object code.